

### Office Action Summary

**Application No.**

10/805,824

**Applicant(s)**

ZHENG, TIEYU

**Examiner**

Marcia A. Golub

**Art Unit**

2828

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 October 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 25, 26, 28, 29, 31-34 and 36-47 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 25, 26, 28, 29, 31-34 and 36-47 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant's arguments filed on 10/31/07 with respect to claim 25 have been considered but are not persuasive.

Regarding applicant's argument that Malone et al. is used inappropriately, since the module "130 includes an open space 132 into which various optical components maybe place, the open space 132 is open to the environment". The examiner agrees that if the cavity of 130 is open to the environment the reference becomes inappropriate. However, the examiner points to Fig 27 of Malone, which discloses a cover glass 48 that covers the actual space where the optical components are placed. Paragraph 108 further clarifies that the inwardly extending cavity below the surface 12, covered by glass 48, can contain various optical components including a laser and a laser driver. The open space 132 is located above the cover glass. It is well know in the art that optical components do not operate efficiently in open environment and it is always desirable to place them in sealed module, preferably filled with gas. Therefore, the use of the Malone reference is appropriate in this case.

Regarding the applicant's argument that the Yamauchi invention will be destroyed if the driver circuit is places inside the module since the circuit will generate additional heat. The examiner points out that if the heat generated by the circuit becomes disruptive to the operation of the laser, a TEC can be placed underneath the circuit to reduce the heat. Also, the object of the Yamauchi's invention is to balance the temperature inside the module, so that the laser and the filter experience the same temperature. Raising the temperature inside the module by adding a circuit will not affect laser and filter disproportionately, especially since Yamauchi provides for installing a desired number of wires based on the temperature requirement.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 25, 26, 28, 29, 33, 34, 42-45** are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamauchi et al. (2001/0033592), hereinafter '592, and further in view of Malone et al. (6,888,169)

Figs 5a and 11b of '592 discloses an optoelectronic module comprising:

25. "a substrate [2] defining a stepped upper surface having a lower portion and an upper portion, the substrate being configured such that a lower surface thereof determines a footprint of the module;

a thermo-electric cooler [3a] disposed on the substrate [2] and having a top portion [3] including a flat top surface, the flat top surface making up an entire top surface of the top portion and being substantially parallel to the lower surface of the substrate, the thermoelectric cooler further being disposed on the lower portion of the stepped surface;

a laser light source [1] disposed on the flat top surface of the top portion [3] of the thermo-electric cooler [3a] such that the thermo-electric cooler is disposed between the substrate [2] and the laser light source [1], wherein the thermo-electric cooler is further thermally coupled to the laser light source to cool the laser light source; and

an electrical connection [1c] extending from the upper portion of the upper surface of the substrate [2] to the laser light source [1]."

'592 discloses laser driver circuit 21 positioned outside the laser package and coupled to the laser diode 1 by means of an electrical connection 1a.

'592 does not disclose placing the laser light control device inside the laser package.

However placing the laser driver inside the optical package would have been

obvious to one of ordinary skill in the art, since it is well known that longer wires introduce noise and instability into the system. Therefore, it is desirable to place the electrical components as close together as possible. '169 provides evidence of placing laser driver inside the optical package. Additionally, 6,747,820 discloses positioning integrated circuit inside the optical module adjacent to an opto-electronic component.

One of ordinary skill would have been motivated to incorporate the teaching of '169 into the device of '592 by placing the laser driver on the upper surface of the substrate in order to position the driver closer to the laser and reduce noise associated with long wires.

'592 and '169 disclose:

26. "further comprising a structure [cap] defining an enclosed environment and including the substrate, wherein:

the substrate [2] is at least partially disposed in the enclosed environment; and

the thermo electric cooler [3a], the laser light source [1] and the electrical connection [1c] are disposed in the enclosed environment. (paragraph 0065)

27. "wherein the laser light control device [21] includes at least one of a driver and an amplifier.

29. "wherein the thermo-electric cooler [3a] includes a plurality of elongated thermo-electric elements and a bottom portion, the thermo-electric elements being disposed substantially in parallel between the top portion [3] and the bottom portion of the thermo-electric cooler, the top planar surface being substantially orthogonal to the thermo-electric elements.

33. "wherein the thermo-electric cooler [3a] and the upper portion of the stepped surface [2] are disposed such that the upper portion is substantially co-planar with a top surface [3] of the thermo-electric cooler.

34. "wherein the substrate [2] includes a substrate body comprising a one-piece component.

42. "wherein the laser light source [1] comprises a laser diode device.

43. "further including a cap [cap] partially defining the enclosed environment, the cap being disposed on the substrate [2]. (paragraph 0065)

44. "further comprising an overhanged ring disposed on a perimeter of the substrate [2] and supporting the cap [cap] thereon.
45. "wherein the cap [cap] includes an optical window [2a] adapted to facilitate an exit of laser light bundles [1a] from the enclosed space.

**Claim 31** is rejected under 35 U.S.C. 103(a) as being unpatentable over '592 and '169 as applied to claim 25 above, and further in view of Watts et al. (6,729,143), hereinafter '143.

'868 discloses an optoelectronic module as described above, in addition '592 discloses using a submount between the laser and the TEC. However, Fig 3 of '143 discloses:

31. "wherein the laser light source [12] is disposed directly on the thermo-electric cooler [31]."

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of '143 into the device of '592 by placing the laser directly on top of the TEC for at least the purpose of improving the heat dissipation from the laser.

**Claims 37-39** are rejected under 35 U.S.C. 103(a) as being unpatentable over '592 and '169 as applied to claim 25 above, and further in view of Acklin et al. (6,778,576) hereinafter '576.

'592 discloses an optoelectronic module as described above:

"wherein the laser light source emits light bundles in a direction substantially parallel with a top surface of the thermo-electric cooler"

'592 does not disclose:

37. "the module further including an optical device disposed on the substrate and adapted to redirect the light bundles from the direction substantially parallel with the top surface of the thermo-electric cooler to a direction that is substantially orthogonal to the top surface of the thermo-electric cooler.
38. wherein the optical device includes at least one of a mirror assembly and prisms.

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39. wherein the optical device is disposed on the thermo-electric cooler."

However, Fig 1 of '576 discloses using a mirror 17 and lens assembly 14 disposed on top of a TEC 25 to redirect the light emitted by the laser 5 in an orthogonal direction.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of '576 into the device of '592 by adding a light steering device on the TEC for at least the purpose of redirecting the light in the orthogonal direction in order to make the assembly compatible with a CAN type package.

**Claim 40** is rejected under 35 U.S.C. 103(a) as being unpatentable over '592 and '169 as applied to claim 25 above, and further in view of Rosenberg et al. (6,703,561) hereinafter '561.

'592 discloses an optoelectronic module as described above, but does not disclose:

40. "wherein the substrate includes a ceramic material."

However, '561 discloses making the substrate 70 out of a ceramic material. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of '561 into the device of '868 by making a ceramic substrate for at least the purpose of improving the heat dissipation from the laser.

**Claim 41** is rejected under 35 U.S.C. 103(a) as being unpatentable over '592 and '169 as applied to claim 25 above.

'592 discloses an optoelectronic module as described above, but does not disclose:

41. "wherein the thermo-electric cooler comprises a T-shaped bottom portion."

However, changing shapes of elements such as ceramic plates for the purposes of better fit inside a desired enclosure package is well known in the art.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of '592 by making the bottom portion of the TEC T-

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shaped for at least the purpose of accommodating the TEC inside an optical module of a desired shape.

**Claims 32, 36, 46 and 47** are rejected under 35 U.S.C. 103(a) as being unpatentable over '592 and '169 as applied to claim 25 above, and further in view of Stewart et al. (2003/0043868) hereinafter '868.

'592 discloses an optoelectronic module as described above, in addition he discloses thermal connection 9 to the substrate to dissipate the heat from the laser, but does not disclose vias in the substrate, however, fig 1 of '868 discloses:

32. "wherein the substrate [102] includes a substrate body and a plurality of vias [holes for 104] extended through the substrate body, the vias being electrically connected [110] by way of the substrate body to the thermo-electric cooler [200] and adapted to dissipate thermoelectricity from the thermo-electric cooler.

36. "wherein the substrate [102] includes a plurality of vias [holes for 104] electrically connected [110] to the laser light control device [104].

46. "wherein the optical window [304] includes a flat glass window."

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of '592 by making vias in the body of the substrate and making the output window out of flat glass, since such elements are well known in the art of semiconductor packaging.

The arguments applied above to claims 32 and 36 are applicable to claim 47 as well.

### ***Conclusion***

This application is in an RCE stage, however all the claims presented in the amendment are anticipated by the prior art of record and could have been finally rejected in the next office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

***Contact Info***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marcia A. Golub whose telephone number is 571-272-8602. The examiner can normally be reached on M-F 9-6 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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